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(54) IMPROVEMENTS IN OR RELATING TO ARRANGEMENTS
 FOR SENSING RECORDED INFORMATION SIGNALS

(71) We EMI LIMITED, a British company of Blyth Road, Hayes, Middlesex do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:

The present invention relates to signal sensing arrangements, and it relates more particularly to such arrangements for sensing information represented by deformations recorded in the surface of a recording medium. Typically, though not necessarily, the medium may comprise a disc of plastics or other suitable material and the deformations may be recorded in sequence on a spiral trajectory in the record surface.

It is known that the recorded information may be sensed by means of a probe electrode which is held adjacent or in contact with the deformed surface of the record and a co-operating electrode, conveniently a flat plate electrode, at the other side of the record. When relative motion is introduced between the probe and the record surface, the deformations recorded in the surface cause a variation in the electrical capacitance between the probe and the co-operating electrode, and the sensing of such variations in capacitance permits the recorded information to be reproduced.

In order to store useful quantities of information in a record of convenient size, however, the dimensions of the deformations and of the probe must be very small, as must the separation between the probe and the record surface. For these reasons, the change in capacitance to be sensed is extremely small, and may amount, in a practical case to no more than a few tens of attofarads (1 attofarad = 10^{-18} F). The capacitance to be sensed appears as an overall change in the total capacitance, mainly consisting of parasitic capacitances formed by adjacent electrostatic screening and capaci-

ties associated with amplifying circuits. These parasitic capacitances usually amount to at least 10 picofarads, and difficulties arise in sensing a change of the order of one part in 10^6 or so, in a capacitance of this magnitude. In addition the parasitic capacitances will be subject to relatively large changes due to vibration and the motion of the record.

Various signal sensing arrangements (e.g. using f.m. techniques or the methods conventionally employed to amplify the signals from condenser microphones) have been proposed for overcoming or reducing the above difficulty, but for a variety of reasons these are not easy to implement.

It is an object of this invention to provide a signal sensing arrangement by means of which the above mentioned difficulty is overcome or reduced and which is simple to implement.

According to the invention there is provided a signal sensing arrangement for sensing information represented by deformations recorded in the surface of a recording medium comprising a probe electrode and a co-operating electrode for location on opposing sides of said medium and a bridge arrangement having an alternating current source and including a pair of closely coupled inductive ratio arms and arranged to sense changes in capacitance between the two electrodes.

The present invention thus involves the use of an inductive ratio arm bridge which may be of a type disclosed, in British Patents Nos. 581,161, 581,164 and 587,878 to which patents the reader is directed for a fuller explanation of the operation and construction of such bridges. Arrangements of this kind have the advantage that the parasitic capacitances can be separated from the desired signal capacitance in such a way that the former are substantially ineffective in altering the measured value of the signal

